

## **5.0 Vashon Island Area**

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The following section provides known information regarding habitat distribution and usage of the various habitats in the Vashon Island Area by the species covered in this report (listed in Section 2.0). Readily known distribution and relative abundance information for the covered species in the Vashon Island Area are also provided. Data gaps are identified in this section where appropriate; however, a detailed discussion regarding data gaps is provided in Section 6.0.

As stated in Section 3.0, a comprehensive examination of physical oceanographic characteristics in the Vashon Island Area is beyond the scope of this report but is available in a separate document (Ebbesmeyer and Cannon 2000). Water and sediment chemistry data in this area are also beyond the scope of this report but are available in the documents listed in Section 3.0.

### **5.1 Physical Setting**

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The Vashon Island Area extends from the northern tip of the Island to a point approximately midway down the Island. The eastern boundary is the upper edge of the supralittoral zone along the East Passage shoreline at Normandy Park, while the western boundary is the King/Kitsap County line running through the middle of Colvos Passage. Narrow beaches consisting of a gravel and cobble substrate characterize the eastern boundary along East Passage. The Vashon Island shoreline along both the east and west sides of the Island consists of gravel, cobble, and rocky beaches.

Along the east side of Vashon Island the shelf grades very steeply into the slope before dropping into the basin depths. Colvos Passage on the west side of the Island is fairly shallow (60 m) at its deepest depth. The substrate in Colvos Passage consists of all grades of sand mixed with gravel, cobble, and rocks. The east side of East Passage contains a variety of habitats with a fairly broad shelf consisting of sand. The slopes adjacent to points of land are primarily coarse sand and gravel, cobble, and rocks.

The deepest water depth in the Vashon Island Area is approximately 230 meters located in the main channel between Vashon Island and Three Tree Point. Figure 5-1 provides information regarding slopes and depths of the seafloor in the Vashon Island Area.

### **5.2 Habitat Distribution**

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In this section, the general distributions of the major habitats are presented. Some information is also provided on the types of fauna associated with these habitats (e.g., eelgrass). The habitats are discussed under three subheadings:

supralittoral, intertidal and shallow subtidal, and finally the deep subtidal. For more information on the types of fauna associated with these habitats, see Section 2.6.

### **5.2.1 Supralittoral**

As compared to the Brightwater Outfall Siting Area (Figure 3-1) and WTD Existing Discharges Area (Figure 4-1), the Vashon Island Area contains much less armored shoreline, with most armoring occurring in the Seahurst Bight region (Figure 5-2). Much of the eastern shoreline of Vashon Island is unmodified, and includes overhanging trees on low to moderately high bluffs with a likely increasing number of vascular plants, grasses, and shrubs in the supralittoral zone.

In the northern section of the Vashon Island Area the supralittoral zone is in part bulkheaded to protect the residential communities north and south of Three Tree Point. To the north of Three Tree Point along the Seahurst shoreline, steep bluffs bound the upper edge of supralittoral zone. The Vashon Island shoreline along both the east and west sides of the Island are bulkheaded in some areas to protect residential developments. A dense buffer of trees and riparian vegetation appears to extend from the supralittoral to some degree inland.

### **5.2.2 Intertidal through Shallow Subtidal**

The intertidal and shallow subtidal zones in the Vashon Island Area contains all major habitat types normally found in central Puget Sound (e.g., eelgrass meadows, kelp forests, flats, tidal marshes, and sub-estuaries). However, this area is the only one where the 1999 WDNR Shorezone Database (WDNR 1999) indicates a native high tidal marsh, which covers a very small area on the eastern shore of Vashon Island just outside of the Vashon Island Area (Figure 5-3). The intertidal and shallow subtidal areas around Vashon Island are characterized by sandy beaches on the east side of the island and narrow sandy beaches on the west side. The distributions of some of the major vegetation taxa used to depict the nearshore habitats in the Vashon Area are shown in Figures 5-3 through 5-7, and are discussed in more detail in the following paragraphs.

*Fucus* sp. is common along the western shoreline, indicating a dominant coarser substrate, and is uncommon along the eastern shoreline of the Island which indicates that finer grained sediments are dominant (Figure 5-4). *Ulva* spp. is commonly found in the Vashon Island Area (Figure 5-5) where it forms continuous beds in the mid and low intertidal zone. *Laminaria* spp. is common but patchy in the upper subtidal zone throughout the area (Figure 5-6). Kelp, based on the 1999 Shorezone Database (WDNR 1999), is rare and patchy in the region (Figure 5-7).

Eelgrass is very common, with continuous meadows recorded on the west, north, and east sides of the Vashon Island Area (Figure 5-8). As in Sections 3.2.1 and 4.2.1, the presence of eelgrass indicates finer grained sediment types in the lower shallow subtidal habitats.

Similar to the Brightwater Outfall Siting Area and the WTD Existing Discharges Area, tideflats are widespread in the Vashon Island Area but their full extent has not been mapped. Flats in Tramp Harbor contain a wide array of infaunal polychaete and amphipod species as well as bivalves (Thom et al. 1984). Prey resources for juvenile chinook and chum salmon have been documented in the flats in the Vashon Island Area (Thom et al. 1984; Simenstad et al. 1991). The flats likely contain the productive microalgae that exists on flats in other regions of Puget Sound. These algae support juvenile salmon prey resources as well as other prey resources important to fish and birds in the region (Simenstad et al. 1991).

### **5.2.3 Deep Subtidal**

The East Passage portion of the Vashon Island Area was extensively studied from 1982 through 1984 as part of the Renton Sewage Treatment Plant Seahurst Baseline Study (Word et al. 1984a). Within the Vashon area, the Seahurst Baseline Study established all or parts of ten transect lines with a total of 56 stations. Five of these stations were located in the northern end of Colvos Passage.

The shelf habitat within the study area in East Passage and along both shorelines of Vashon Island consisted primarily of medium to fine sand. The dominant mollusc in the entire study area was the bivalve *Psephedia lordi*. The dominant polychaete on both the north and south sides of Three Tree Point was *Notomastus tenuis*, while the subdominants were *Prionospio* spp. on the north side and *Mediomastus* spp. on the south side. The dominant crustacean was the ostracod *Euphilomedes carcharodonta*. The shelf area around Vashon Island is narrow and rapidly drops off to slope depths. The dominant species on the shelf surrounding Vashon Island were the polychaete *Phyllochaetopterus prolifica* and the ostracod *Euphilomedes carcharodonta*. These two species alternated being the numerical dominant around the Island, with *Phyllochaetopterus* appearing to dominate habitats with higher water current speeds.

The slope depth contained sediments consisting of a small amount of sand around points of land, but was principally silt and clay. The fine silt on the steeper slopes was held in place by the large cigar shaped tubes of polychaetes in the genus *Asychis* spp. There was no single numerically dominant polychaete, but rather a mix of the species seen in the shelf area. The same was true for the crustaceans, with *Euphilomedes carcharodonta*, *E. producta*, and the caprellid amphipod *Tritella pilimana*, vying for dominance depending on the amount of sand present.

Habitats in the deep basin consisted of fine silts and clays. The numerically dominant organism at these basin depths was the bivalve mollusc *Axinopside serricata*. In areas with a substantial amount of organic material and where the clay content of the sediment was greater than the silt content, the dominance switched to the bivalve *Macoma carlottensis*. However, this occurred in only two, small, geographically isolated areas. At these depths the dominant polychaete was in the genus *Ampharete* spp. and the dominant crustaceans were *Eudorella pacifica*, *Eudorelloopsis integra*, and, in areas with more clay than silt, *Euphilomedes producta*.

## **5.3 Species Distribution and Occurrence**

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The distribution and occurrence information presented below for the proposed HCP species is based upon documented information cited in available literature and/or personal communication with biologists/experts from local, state, and federal agencies. As stated in previous sections, most of the fish distribution data are based upon video and trawl data and are dependent upon time of year, depth, and location sampled. Many pelagic fish are rarely documented in trawl surveys as the sampling method favors capturing semi-demersal or demersal fish. The absence of pelagic and other species from trawl and video data does not preclude those species from inhabiting waters in the Vashon Island Area. The majority of data for marine birds are based upon seasonal aerial and land surveys and are dependent upon favorable sighting conditions, time of year surveyed, species wariness, and location surveyed.

### **5.3.1 Marine Mammals and Birds**

#### **Orca – *Orcinus orca***

Resident Orcas, including the J and K pods, have been sighted off Vashon Island in fall. The whales follow seasonal salmon runs with yearly sightings clustered from June through October (Balcomb 1982; Olesiuk et al. 1990,). In recent years, the J pod has been observed in the Vashon Island Area during the fall months (K. Koski, Whale Museum, pers. comm.). Transient whales are not known to occur in inland Puget Sound waters (Forney et al. 2000).

#### **Harbor Porpoise – *Phocoena phocoena***

There have been no confirmed sightings of harbor porpoises south of Admiralty Inlet (including the Vashon Island Area) during the last several years (Calambokidis et al. 1992; B. Hanson, NMML, pers. comm.). Harbor porpoises are not likely to be found in the Vashon Island Area.

#### **Steller Sea Lion – *Eumetopias jubatus***

Small numbers of Steller sea lions have been documented in the inland waters of Puget Sound. There are no documented occurrences of Steller sea lions in the



Vashon Island Area; however, there have been sightings south of the area and it is likely the sea lions travel through Vashon Island Area waters (Jeffries et al. 2000). In addition, Steller sea lions are known to use navigational buoys in central Puget Sound as haulout sites. There is a navigational buoy off Three Tree Point that California sea lions are known to use for a haulout site and it is possible that Steller sea lions use this buoy as well (Jeffries et al. 2000).

#### **Common Murre – *Uria aalge***

WDFW (2000) found that from 1992 through 1999 the number of common murrelets in the Vashon Island Area in the winter ranged from 0 to 5 animals/km<sup>2</sup> (Figure 3-8). In the summer months, the average number of common murrelets also ranged from 0 to 5 animals/km<sup>2</sup>, with common murrelets only found in the Tramp Harbor area (Figure 3-9). During the 1999 and 2000 annual CBC surveys on Vashon Island, a total of 4 and 41 common murrelets were seen, respectively (S. Trevathan, Vashon Island CBC Coordinator, pers. comm.).

#### **Marbled Murrelet – *Brachyramphus marmoratus***

WDFW (2000) observed no marbled murrelets in the Vashon Island Area during winter and summer surveys from 1992 through 1999 (Figures 3-10 and 3-11). During the 1999 annual CBC survey on Vashon Island, one marbled murrelet was seen and none were seen in 2000 (S. Trevathan, Vashon Island CBC Coordinator, pers. comm.).

#### **Harlequin Duck – *Histrionicus histrionicus***

WDFW (2000) found that from 1992 through 1999, the number of harlequin ducks in the Vashon Island Area in the winter ranged from 0 to 5 animals/km<sup>2</sup> with sightings along the eastern shoreline of the Vashon Island Area and none around Vashon Island (Figure 3-12). In the summer months, no harlequin ducks were observed in the Vashon Island Area (Figure 3-13). A total of 8 harlequins were seen in 2000 during the Vashon Island CBC survey but none were seen in 1999 (S. Trevathan, Vashon Island CBC Coordinator, pers. comm.).

### **5.3.2 Salmonids**

#### **Bull Trout – *Salvelinus confluentus***

The distribution and abundance of bull trout in Puget Sound and nearshore waters are not well known and populations of bull trout have not been documented in the Vashon Island Area. However, there have been isolated observations of bull trout in some of the rivers and streams surrounding the Vashon Island Area and it is possible bull trout travel through the waters in this area (King County 2000a). Miller and Borton (1980) documented a single occurrence of Dolly Varden in the central basin off Three Tree Point (see Figure B-12, Appendix B). As Dolly Varden are closely related to bull trout and it is difficult to distinguish the two species without genetic testing, it is possible that this fish was a bull trout.

**Chinook Salmon – *Oncorhynchus tshawytscha***

Comprehensive site-specific studies in the Vashon Island Area for juvenile chinook abundance and residence time have not been conducted. Beach seining surveys were conducted by King County in the eastern portion of the Vashon Island Area at Seahurst from June to August in 2000. Juvenile wild and hatchery chinook (less than twenty-five) were observed in all three months (Mavros and Brennan, in prep.).

Miller and Borton (1980) reported chinook salmon throughout Colvos Passage and a single occurrence near Seahurst, but abundance data were not reported (see Figure B-9, Appendix B).

WDFW (1993) did not document populations of chinook within the Vashon Island Area. However, rivers and streams surrounding the area support populations of chinook, some of which were listed as healthy with consistent returns. It is likely that the migratory pathway of these populations bring adult chinook to the waters of the Vashon Island Area (WDFW 1993b).

**Chum Salmon – *Oncorhynchus keta***

There have been no comprehensive site-specific studies in the Vashon Island Area for juvenile chum abundance and residence time. Beach seining surveys conducted by King County in the Vashon Island Area at Seahurst from June to August 2000 found small numbers of chum salmon (less than 10) only in June (Mavros and Brennan, in prep.).

Distribution data for Puget Sound fishes through 1973 showed observations of chum salmon within the Vashon Island Area (Miller and Borton 1980). Most occurrences within this area were in Colvos Passage (see Figure B-6, Appendix B). Although WDFW (1993) did not document populations of chum salmon in streams or rivers within the Vashon Island Area, the migratory pathway of chum salmon in waters to the north and south of the Vashon Island Area likely bring adult chum to the Vashon Island Area (WDFW 1993b).

**Coho Salmon – *Oncorhynchus kisutch***

There have been no comprehensive site-specific studies in the Vashon Island Area for juvenile coho abundance and residence time. Beach seining surveys conducted by King County in the Vashon Island Area at Seahurst from June to August 2000 found small numbers of coho salmon (less than five) in June and July but none in August (Mavros and Brennan, in prep.).

Although specific abundance data were not available, coho salmon were found throughout the entire Vashon Island Area in data compiled up to 1973 (Miller and Borton 1980) (see Figure B-7, Appendix B). Although WDFW (1993) did not list populations of coho within the Vashon Island Area, the presence of coho salmon in the rivers and streams surrounding the area will likely bring these fish within the waters of the Vashon Island Area (Miller and Borton 1980; WDFW 1993b).

#### **Cutthroat trout – *Oncorhynchus clarki***

Data on distribution of cutthroat trout compiled through 1973 (Miller and Borton 1980) revealed a cluster of cutthroat trout observations on the west side of northern Vashon Island (eastern Colvos Passage) (see Figure B-10, Appendix B). Other sections of the Vashon Island Area did not show the presence of cutthroat trout. Little information on distribution of cutthroat trout in the Vashon Island Area is available, but it is likely that cutthroat migrate through the waters in the area as there are known populations in rivers and streams in the south sound.

#### **Sockeye salmon (*Oncorhynchus nerka*) and Steelhead Trout (*Oncorhynchus mykiss*)**

There were no documented occurrences of either sockeye salmon or steelhead trout in the Vashon Island Area in data compiled through 1973 (Miller and Borton 1980) (see Figure B-8, Appendix B). No other information regarding sockeye and steelhead distribution in the Vashon Island Area was readily available.

### **5.3.3 Lamprey**

#### **Pacific Lamprey (*Entosphenus tridentatus*) and River Lamprey (*Lampetra ayresii*)**

At this time there are no site-specific data for Pacific and River lampreys in the Vashon Island Area. However, these lampreys are known to exist in Washington waters, and therefore, may be present in the Vashon Island Area streams and marine waters (Hart 1980; Wydoski and Whitney 1979).

### **5.3.4 Invertebrates**

#### **Northern Abalone (*Haliotis kamtschatkana*) and Olympia Oyster (*Ostrea conchaphila*)**

There were no documented occurrences of either the northern abalone or the Olympia oyster in the Vashon Island Area. As stated in Sections 3.0 and 4.0, the northern abalone is generally not found in estuaries and is primarily found on the outer coast and in the Straits (Sloan and Breen 1988). Although it is possible that isolated occurrences of Olympia oysters may be found in the Vashon Island Area, the numbers are not enough to sustain a breeding population as water temperatures in the this area are colder than spawning requirements (Couch and Hassler 1989) (see Section 3.3.4).

### **5.3.5 Marine Fish**

Of the 24 species of marine fishes addressed in this report, seven were observed and identified in the Vashon Island Area by WDFW video and trawl surveys (Figure 5-8 and Appendix C). For both the video and trawl surveys, the coverage

in the Vashon Island Area was limited in Colvos Passage and in the northern and central portion of the area. Figure 5-9 identifies known forage fish spawning grounds in the Vashon Island Area (WDFW 1992).

Table 5-1 provides a summary of WDFW trawl and video data for the marine fish proposed for coverage in this report. Their distribution, primary habitat on which they were most often observed, the depth range at which they were observed, and their relative abundance within the Vashon Island Area are provided. As stated in Section 3.3.5, the fact that a species was not observed does not mean that it was not present. These species are mobile and many tend to hide in cracks and crevices. In addition, many have cryptic coloration making them difficult or impossible to see even when they are in the open. Seasonal variation in food resources, life history stages (e.g., spawning, juvenile recruitment), or environmental conditions can also affect the presence, distribution, and abundance of fish species.

#### **Ground Fish**

##### **Green (*Acipenser medirostris*) and White (*Acipenser transmontanus*) Sturgeon**

There were no documented records of green or white sturgeon in the Vashon Island Area, but Miller and Borton (1980) did report two records of green sturgeon occurrences somewhere within Puget Sound.

##### **Pacific Cod – *Gadus macrocephalus***

Miller and Borton (1980) reported Pacific cod along the west side of Vashon Island (see Figure B-15, Appendix B). WDFW trawl data indicated one occurrence in the main basin (Figure 5-9 and Appendix C).

##### **Walleye Pollock – *Theragra chalcogramma***

Miller and Borton (1980) reported observations of walleye pollock along the west side of Vashon Island (eastern portion of Colvos Passage) (see Figure B-17, Appendix B). WDFW found walleye pollock at three Vashon Island Area trawl stations (Figure 5-8 and Appendix C).

##### **Pacific Hake – *Merluccius productus***

Miller and Borton (1980) did not report observations of Pacific hake in the Vashon Island Area (see Figure B-16, Appendix B). However, WDFW found hake at all of their Vashon Island Area trawl stations (Figure 5-8 and Appendix C).

##### **Lingcod – *Ophiodon elongates***

No records of lingcod in the Vashon Island Area were found based on data reported in Miller and Borton (1980) and WDFW video and trawl surveys (Figure 5-8 and Appendix C).

**Forage Fish****Pacific Herring – *Clupea harengus pallasii***

Miller and Borton (1980) reported Pacific herring all along the west side of Vashon Island and in mid-channel off Three Tree Point (see Figure B-5, Appendix B). WDFW found herring off Dolphin Point (the northern portion of Vashon Island) during a trawl survey relatively close to shore (Figure 5-8 and Appendix C). Quinnell and Schmitt (1991) found Pacific herring most abundant in shallow water (9-37 m) and estimated an abundance of nearly 1.5 million individuals in the central Puget Sound area in 1987.

While there are no documented Pacific herring spawning grounds within the Vashon Island Area, spawning grounds are documented to the south (Quartermaster Harbor), west (Port Orchard/Madison), and north (Port Susan) (Lemberg et al. 1997). It is probable that Pacific herring of all ages pass through the Vashon Island Area on their way to or from the spawning grounds, especially during spawning season (late January through early June).

**Sand Lance – *Ammodytes hexapterus***

Miller and Borton (1980) reported sand lance near Three Tree Point (Figure B-18, Appendix B) (one of the documented spawning grounds in the Vashon Island Area (WDFW 1992). There are several sand lance spawning beaches in the eastern portion of the Vashon Island Area (Figure 5-10). Therefore, sand lance are seasonally abundant in the area during spawning season (November to February).

Beach seining surveys conducted by King County in the Vashon Island Area at Seahurst from June to August 2000 found sand lance (less than 100) in June and August but none in July (Mavros and Brennan, in prep.).

**Surf Smelt – *Hypomesus pretiosus***

Miller and Borton (1980) did not report surf smelt in the Vashon Island Area (see Figure B-13, Appendix B), although there are several surf smelt spawning beaches in the Vashon Island Area (Figure 5-9). Spawning grounds are located on the eastern side of Vashon Island and also along the shoreline of the eastern portion of the area (WDFW 1992). Surf smelt are abundant in the area during spawning season (mostly in the fall and winter).

**Eulachon – *Thaleichthys pacificus***

No specific records of eulachon in the Vashon Island Area were found. This is considered a rare species in Puget Sound (Emmett et al. 1991).

**Rockfish**

The following rockfish species proposed for coverage in the HCP are distributed along the outer Washington coasts and in the Straits surrounding the San Juan Islands but are not known to occur in inland Puget Sound waters or in the Vashon

Island Area: blue, widow, china, and tiger rockfish (W. Palsson, WDFW, pers. comm.; J. Christiansen, Seattle Aquarium, pers. comm.).

Although the following rockfish species have been documented in other parts of the Sound, there were no readily available reports of these species in the Vashon Island Area: greenstriped, yellowtail, black, bocaccio, canary, redstripe, and yelloweye rockfish.

**Brown Rockfish – *Sebastes auriculatus***

Miller and Borton (1980) reported an observation of a brown rockfish north of Three Tree Point (see Figure B-19, Appendix B). WDFW video surveys documented brown rockfish at two sampling stations in shallow waters (less than 19 m) north of Seahurst (Figure 5-8 and Appendix C).

**Copper Rockfish – *Sebastes caurinus***

Miller and Borton (1980) reported observations of copper rockfish along the mainland throughout the Vashon Island Area (see Figure B-20, Appendix B). WDFW video surveys documented copper rockfish at two sampling stations in shallow waters (less than 19 m) north of Seahurst (Figure 5-8 and Appendix C).

**Quillback Rockfish – *Sebastes maliger***

Miller and Borton (1980) reported quillback rockfish along the eastern side of Colvos Passage (see Figure B-24, Appendix B). WDFW documented quillback rockfish at most stations sampled (both video and trawl surveys) (Figure 5-8 and Appendix C).



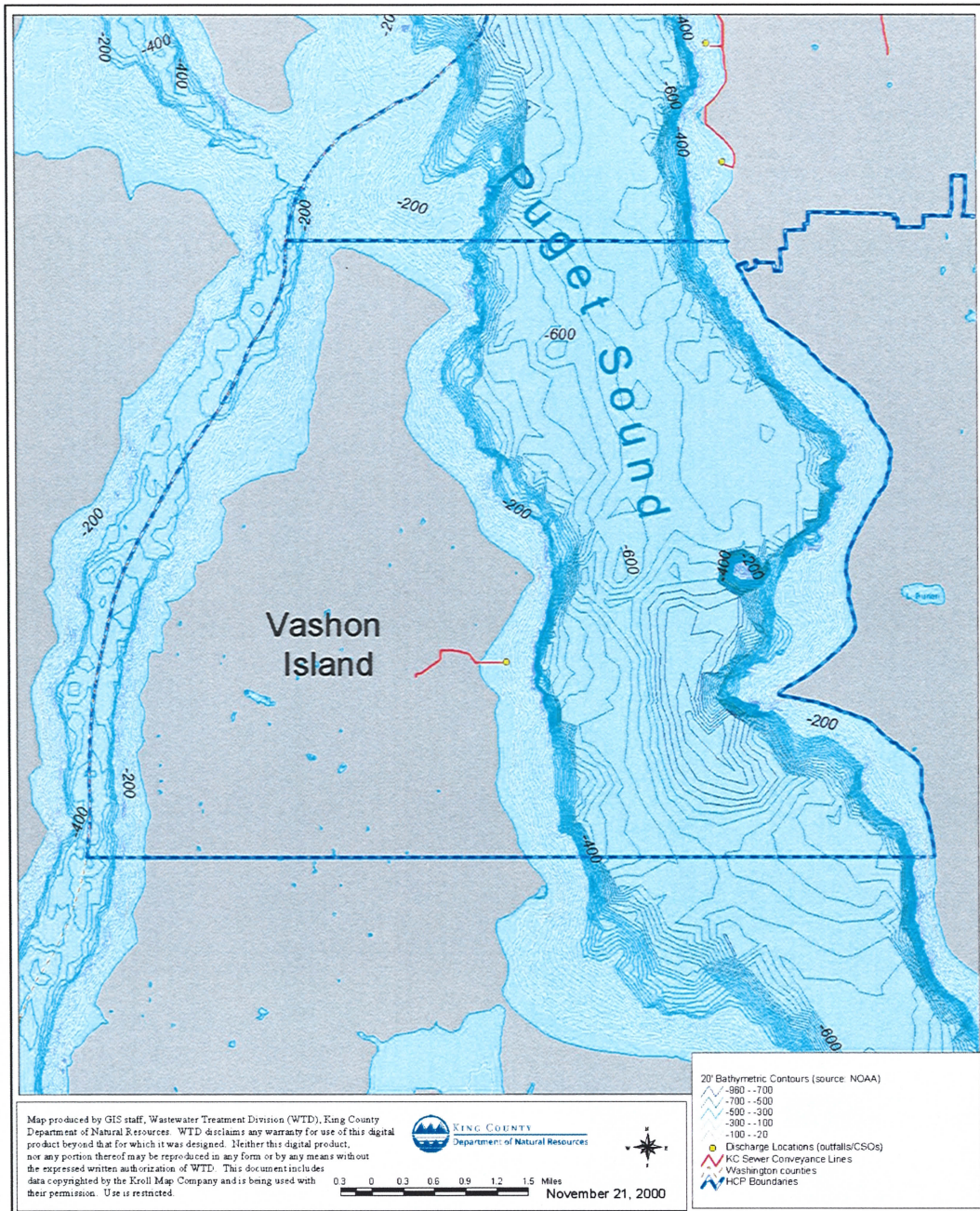


Figure 5-1. Bathymetric contours in the Vashon Island Area



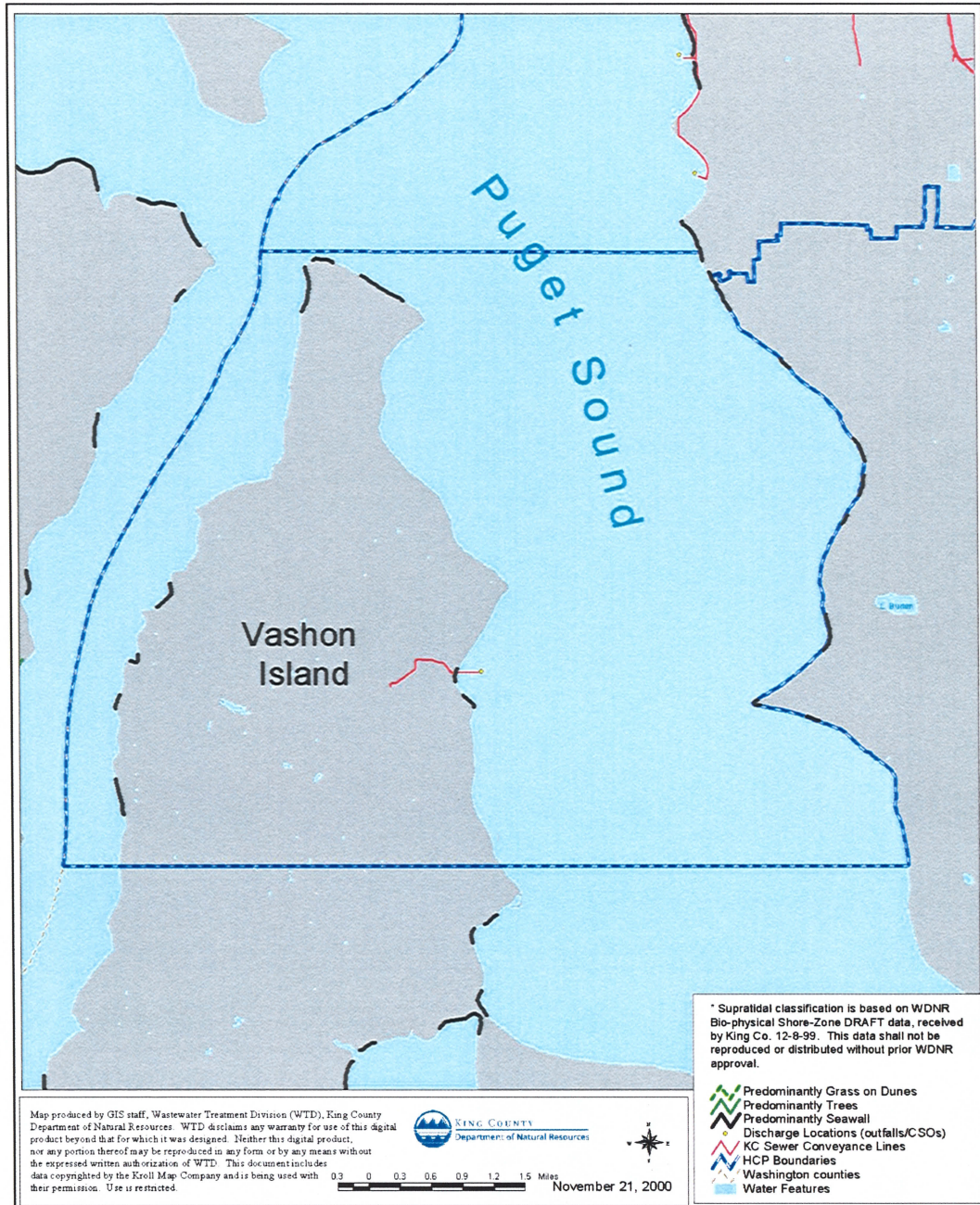


Figure 5-2. Supralittoral zone in the Vashon Island Area



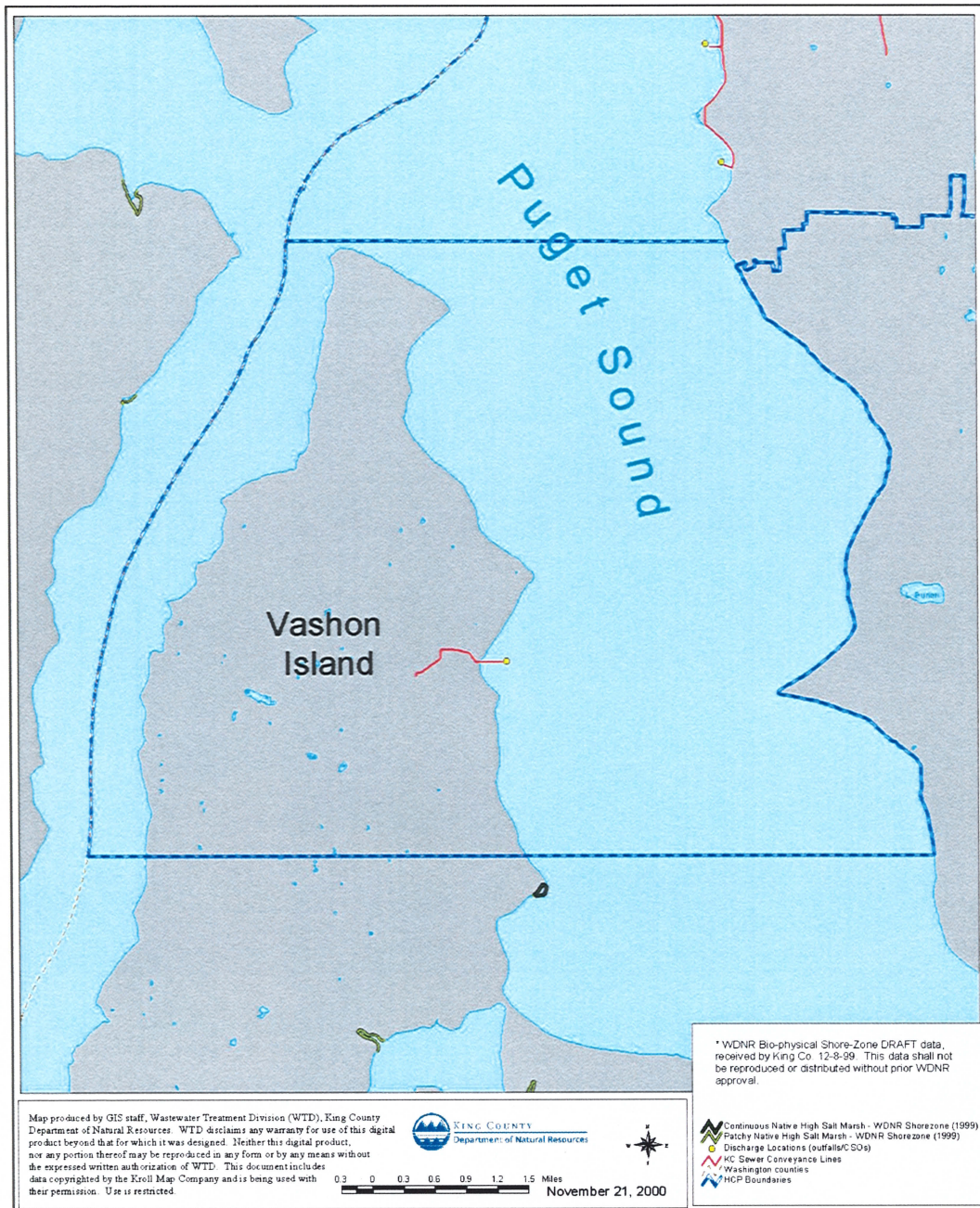


Figure 5-3. Distribution of native salt marsh in the supralittoral zone through the shallow subtidal zone of the Vashon Island Area



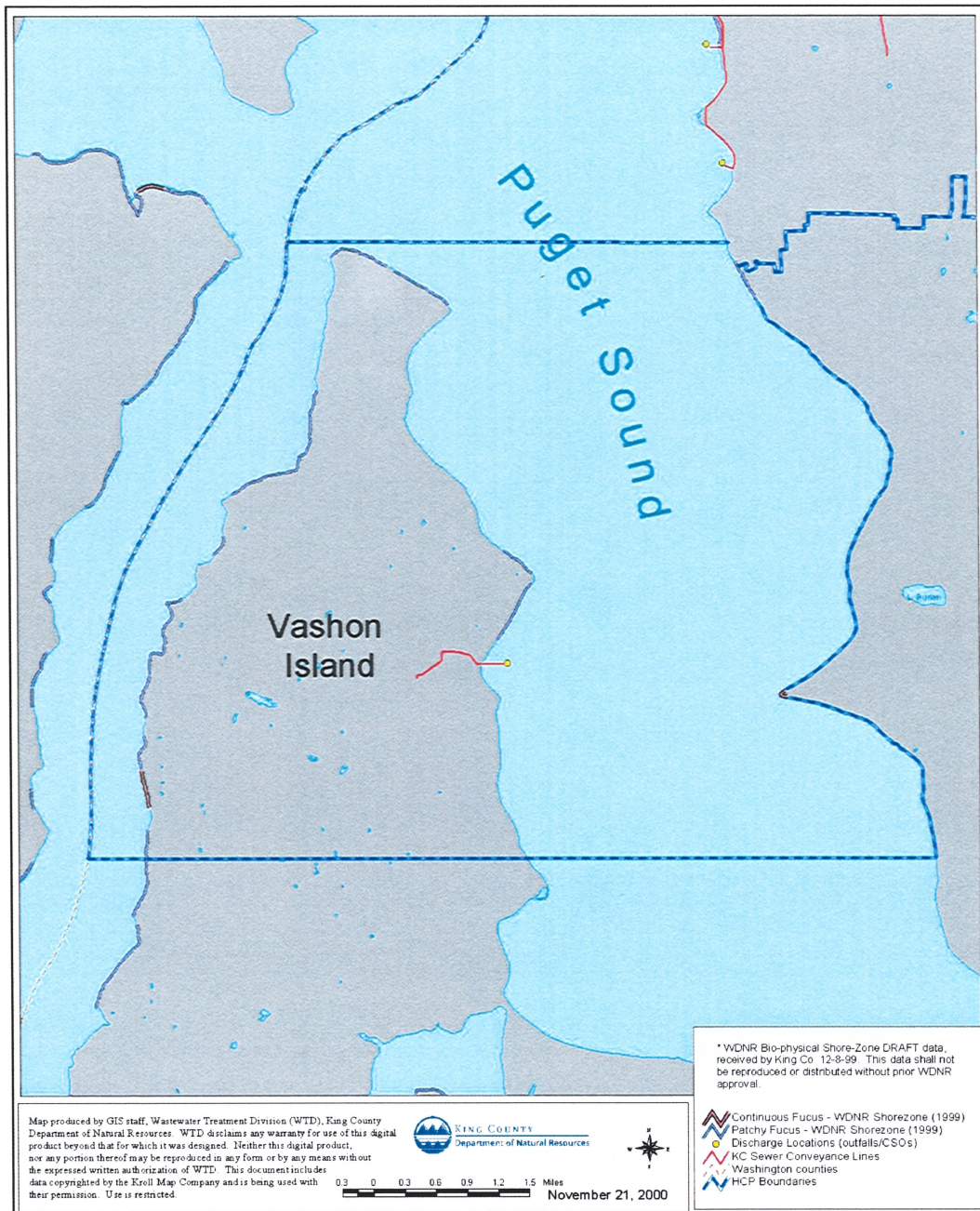


Figure 5-4. Distributions of rockweed (*Fucus*) in intertidal zone of the Vashon Island Area







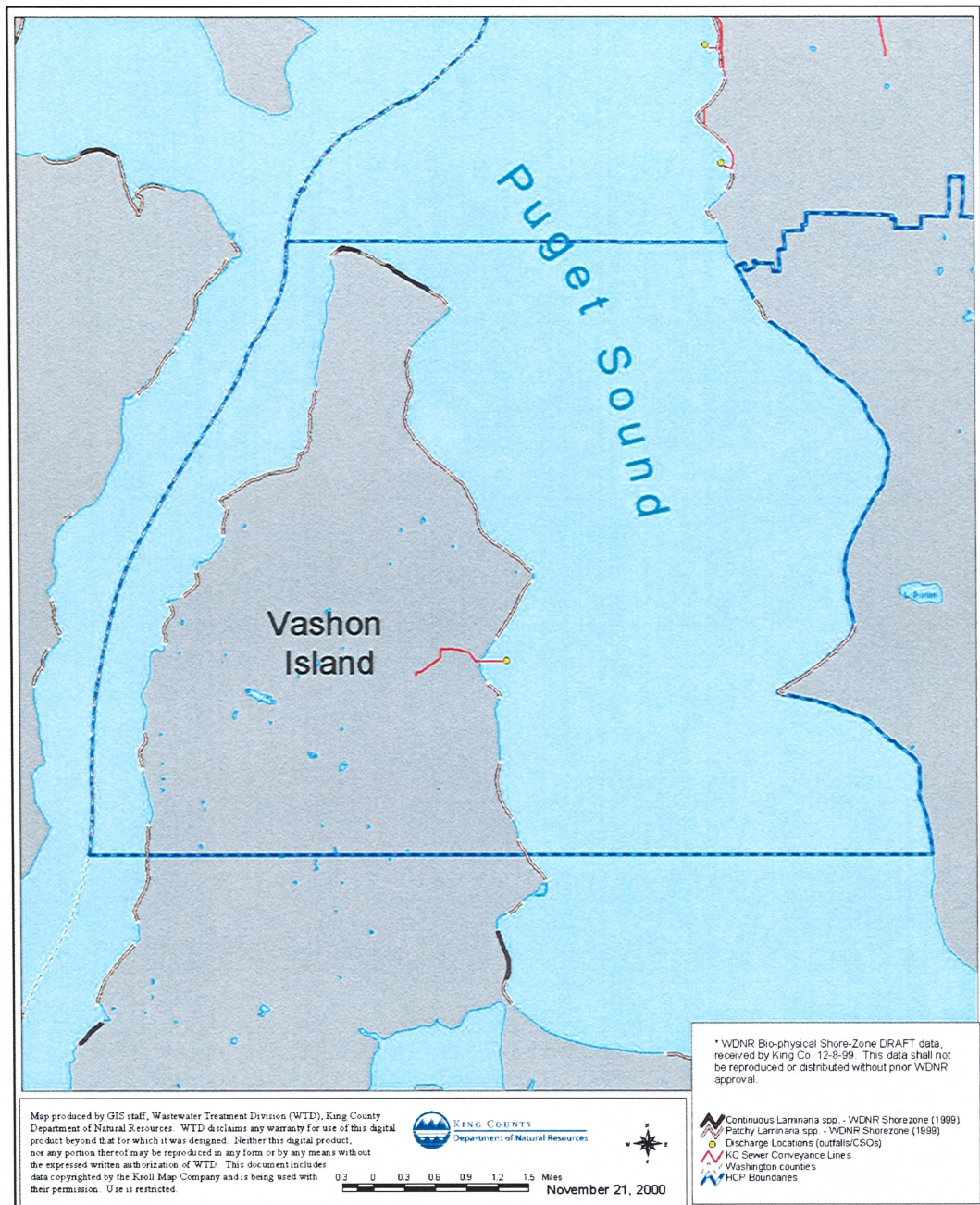


Figure 5-6. Distributions of *Laminaria* spp. in the intertidal zone through the shallow subtidal zone of the Vashon Island Area



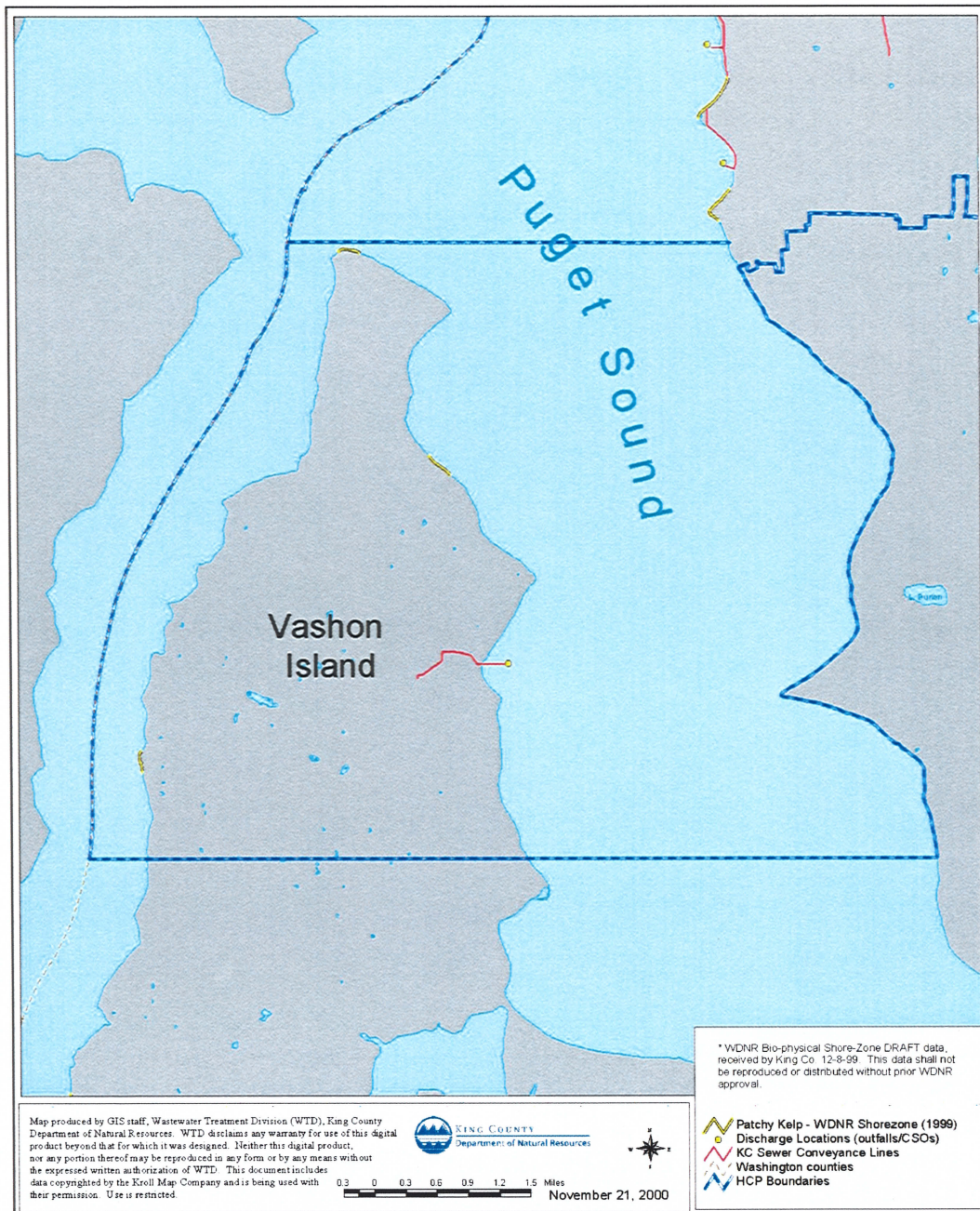


Figure 5-7. Distributions of kelp (*Nereocystis luetkeana*) in the intertidal zone through the shallow subtidal zone of the Vashon Island Area



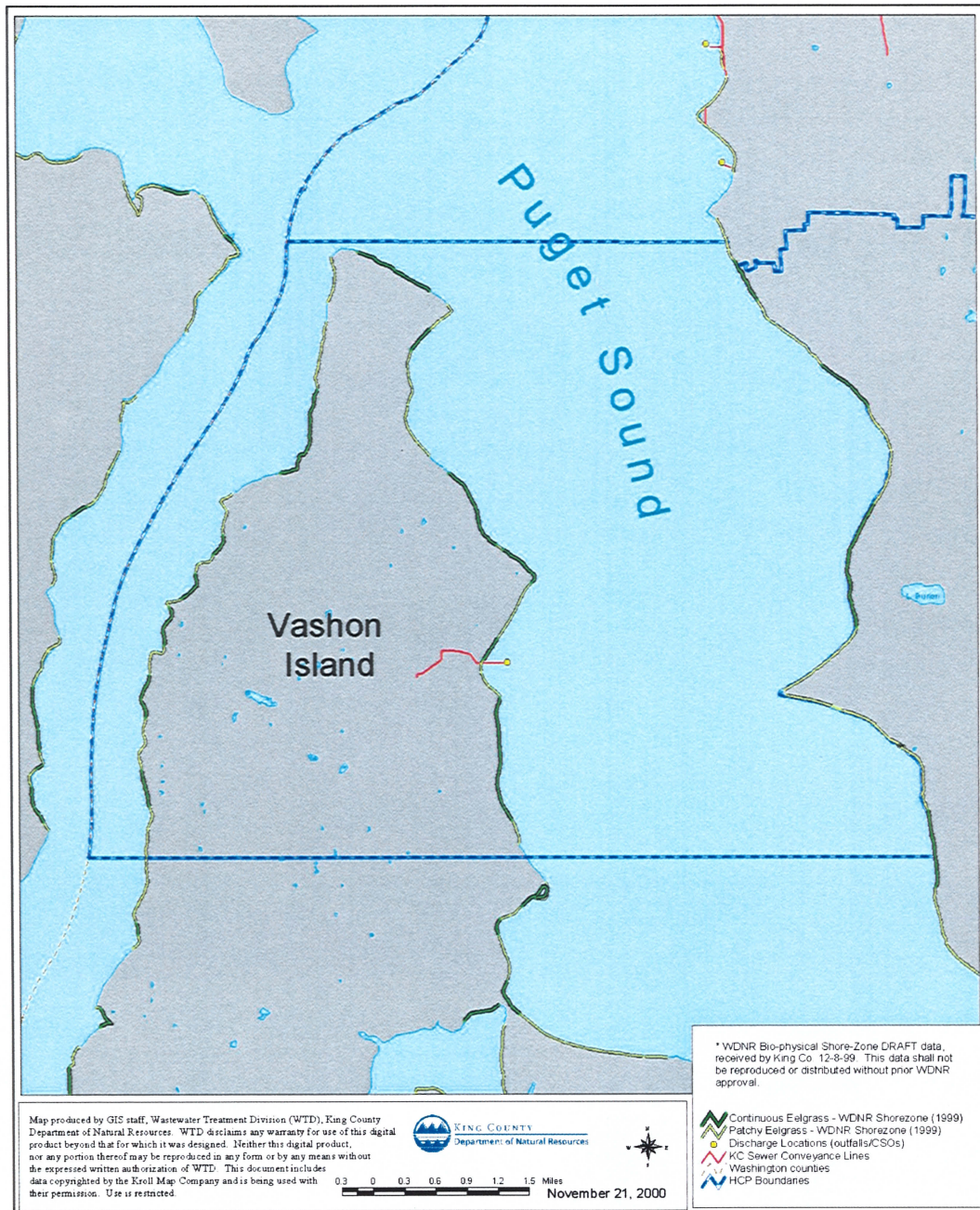


Figure 5-8. Distributions of eelgrass (*Zostera marina*) in the intertidal zone through the shallow subtidal zone of the Vashon Island Area



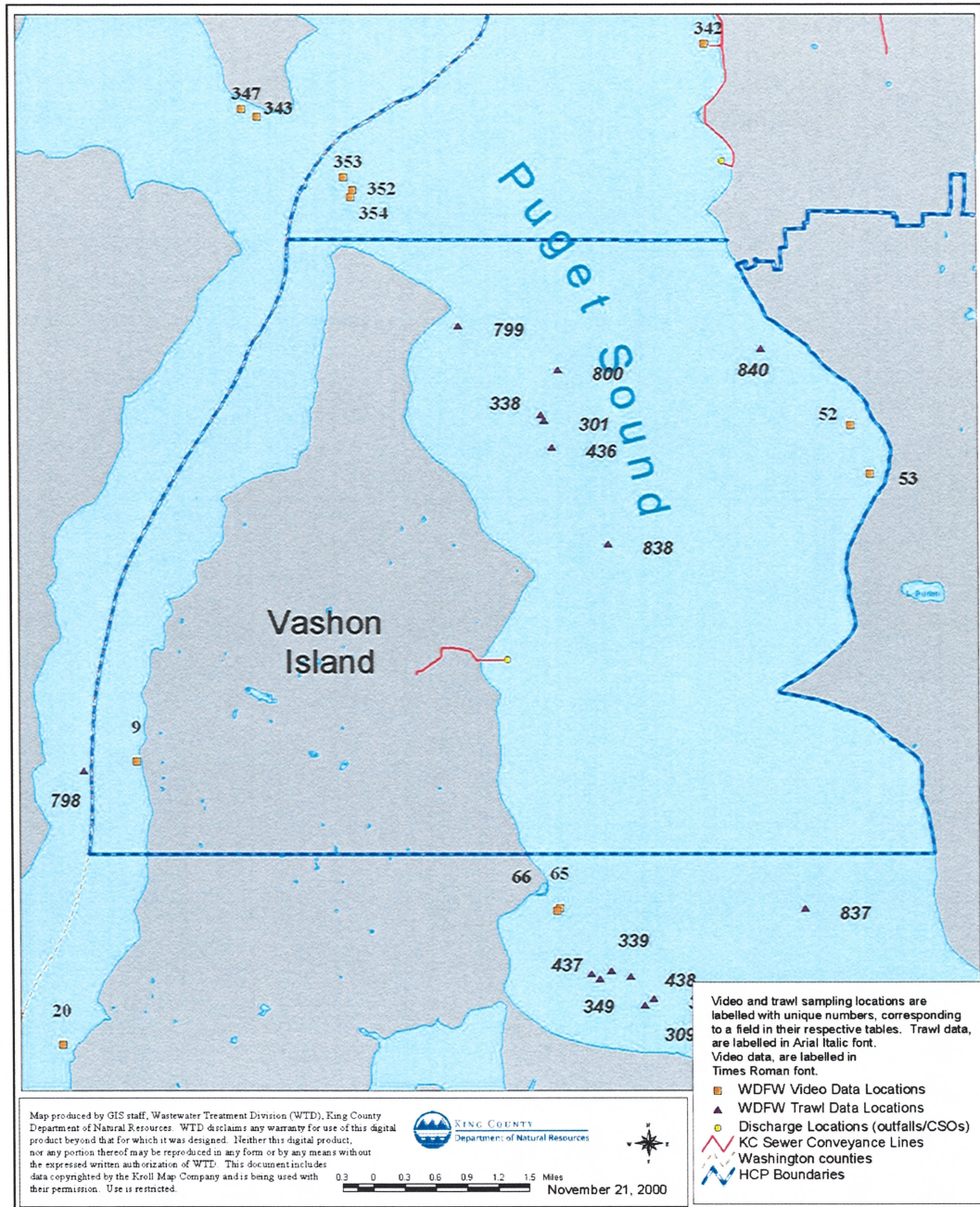


Figure 5-9. WDFW trawl and video marine fish data in the Vashon Island Area. See Appendix C for fish species noted at each location.







Table 5-1. Marine fish species observed in the Vashon Island Area.<sup>1</sup>

Common Name	Genus species	Distribution	Primary habitat	Depth range (ft)	Average density (ind/m <sup>2</sup> )	Relative abundance <sup>2</sup>
Green Sturgeon	<i>Acipenser medirostris</i>	none observed	NA	NA	NA	NA
White Sturgeon	<i>Acipenser transmontanus</i>	none observed	NA	NA	NA	NA
Pacific Cod (S & C P.S.)	<i>Gadus macrocephalus</i>	Between Dolphin Pt and Pt Beals, offshore from Sunset Beach	NA	>360	0.0008 <sup>a</sup>	2
Walleye Pollock (S. P.S.)	<i>Theragra chalcogramma</i>	Dolphin Pt, between Dolphin Pt & Pt Beals, Pt Beals, offshore from Sunset Beach	NA	126- >360	0.0003 <sup>a</sup>	4
Pacific Hake (C P.S.)	<i>Merluccius productus</i>	Dolphin Pt, between Dolphin Pt & Pt Beals, Pt Beals, offshore from Sunset Beach, S of Brace Pt	NA	>126	0.0012 <sup>a</sup>	8
Lingcod	<i>Ophiodon elongatus</i>	none observed	NA	NA	NA	NA
Pacific Herring	<i>Clupea harengus pallasii</i>	Dolphin Pt	NA	126- 240	0.0002 <sup>a</sup>	1
Sand Lance	<i>Ammodytes hexapterus</i>	Spawning grounds (1 Nov to 15 Feb): S of Pt Brace, between Pt Brace & Three Tree Pt, N & S sides of Three Tree Pt	sand gravel beaches for spawning	upper inter-tidal		none observed during surveys, probably abundant during spawning
Unidentified Baitfish	<i>Herring or Sand Lance</i>	none observed	NA	NA	NA	NA
Surf Smelt	<i>Hypomesus pretiosus</i>	Spawning grounds (mostly fall and winter in this area): between Brace Pt & Three Tree Pt, N side of Three Tree Pt, S of Three Tree Point, Dolphin Pt, Pt Beals, S of Pt Beals	very coarse sand to pea gravel beaches for spawning	upper inter-tidal		none observed during surveys, probably abundant during spawning

Table 5-1. Marine fish species observed in the Vashon Island Area.<sup>1</sup>

Common Name	Genus species	Distribution	Primary habitat	Depth range (ft)	Average density (ind/m <sup>2</sup> )	Relative abundance <sup>2</sup>
Eulachon	<i>Thaleichthys pacificus</i>	none observed	NA	NA	NA	NA
Brown Rockfish	<i>Sebastes auriculatus</i>	N of Three Tree Pt	sand/shell	48	0.05 <sup>b</sup>	2
Copper Rockfish	<i>Sebastes caurinus</i>	N of Three Tree Point, near Sunset Beach	sand/shell	44	0.137 <sup>b</sup>	3
Greenstriped Rockfish	<i>Sebastes elongatus</i>	none observed	NA	NA	NA	NA
Widow Rockfish	<i>Sebastes entomelus</i>	none observed	NA	NA	NA	NA
Yellowtail Rockfish	<i>Sebastes flavidus</i>	none observed	NA	NA	NA	NA
Quillback Rockfish	<i>Sebastes maliger</i>	Dolphin Pt, between Dolphin Pt & Pt Beals, Pt Beals, offshore from Sunset Beach, N of Three Tree Point	sand/shell	79	0.0224 <sup>a</sup>	7
Black Rockfish	<i>Sebastes melanops</i>	none observed	NA	NA	NA	NA
Blue Rockfish	<i>Sebastes mystinus</i>	none observed	NA	NA	NA	NA
China Rockfish	<i>Sebastes nebulosus</i>	none observed	NA	NA	NA	NA
Tiger Rockfish	<i>Sebastes nigrocinctus</i>	none observed	NA	NA	NA	NA
Bocaccio	<i>Sebastes paucispinus</i>	none observed	NA	NA	NA	NA
Canary Rockfish	<i>Sebastes pinniger</i>	none observed	NA	NA	NA	NA
Redstripe Rockfish	<i>Sebastes proriger</i>	none observed	NA	NA	NA	NA
Yelloweye Rockfish	<i>Sebastes ruberrimus</i>	none observed	NA	NA	NA	NA
Unidentified Rockfish	<i>Sebastes spp.</i>	none observed	NA	NA	NA	NA

NA - Not Available

<sup>1</sup>Based on data from Tech Report 79, Battelle, and WDFW.<sup>2</sup>Relative abundance indicates the number of times a given species was observed during the surveys.<sup>a</sup>Based on WDFW trawl surveys (Palsson data).<sup>b</sup>Based on WDFW video surveys (Palsson data).